REMARKS

The foregoing amendment is submitted to clarify claims 25-26 and to address the rejection of said claims under 35 USC Section 112. In particular, claims 25 and 26 have been amended to indicate that the determining step provides theoretical saturation properties of the gas product and then compares the gathered data to the theoretical saturation properties in order to determine the liquefaction status of the gas product. Support for the amendment to claims 25 and 26 is set forth in the specification at page 5, lines 4-7. Entry of the amendment to claims 25 and 26 is therefore deemed proper and is respectfully requested. Entry of the amendment to claims 25 and 26 is deemed to obviate the rejection of said claims under 35 USC Section 112.

Referring to the Office Action claims 12 and 20 stand rejected under 35 USC Section 112. Claim 12 is rejected because the Office Action questions the meaning of "dead-ended connection" and "flow-through connection". The rejection is hereby traversed and reconsideration is respectfully requested.

Applicants respectfully submit that the terms "dead-ended connection" and "flow-through connection" are commonly used by those of ordinary skill in the art who manufacture or use piping components such as pressure transducers. A dead-ended connection is located on the main flow stream so that gas does not enter or pass through the liquefaction monitoring unit. A flow-through connection is designed

so that the entire main flow stream passes through the liquefaction monitoring unit. As previously indicated, these terms are known in the art by those practicing in the industry and furthermore the terms themselves are consistent with the meaning attributed to them by those of ordinary skill as is apparent from the present specification as disclosed from page 15, line 26 in the discussion of Figures 6A-7. For these reasons, the rejection of claim 12 is improper and should be withdrawn. Because claim 12 has not been rejected on prior art grounds, it is respectfully submitted that claim 12 is now in condition for allowance.

Claim 20 refers to the housing enclosing the tolerance-level-determination engine (see claim 18) as being selectively movable along the gas-piping system. The Office Action questions the meaning of the term "selectively removable" and how this is accomplished. The rejection is hereby traversed and reconsideration is respectfully requested.

The housing referred to in claim 20 encloses a tolerance-level-determination engine and a results-reporting engine. As illustrated in Figure 1 and as discussed at page 4, beginning at line 14 data collectors 28 are distributed along the gas piping system 26 at sensing points for providing temperature and pressure information about the product in the gas distribution system. As indicated beginning at page 11, line 22, the liquefaction monitoring unit which includes the tolerance-level-determination engine and the results-reporting engine may also include the data collector 28 or may be separated therefrom. In either case, the position of the data collectors 28 and the association of the liquefaction monitoring unit therewith can be

at any position along the gas piping system. Accordingly, it necessarily follows that the position of these devices including the two engines contained in the housing comprising the subject matter of claim 20 can be moved to different locations along the gas-piping system according to need. The manner in which this can be done is routine and would be understood by those of ordinary skill in the art. One skilled in the art would understand how to attach a data collector to the gas piping system and would likewise know how to routinely connect the liquefaction monitoring unit to the data collector. It is therefore submitted that claim 20 meets all of the requirements of 35 USC Section 112 and withdrawal of the rejection is therefore deemed proper and is respectfully requested.

Because claim 20 has not been rejected on prior art grounds, it is respectfully submitted that claim 20 is in condition for allowance and early passage to issue of this claim is respectfully requested.

Claim 11 has been rejected under 35 USC Section 112 on the ground that it is unclear how the compensation circuit selected from a temperature compensation circuit and a pressure compensation circuit is constructed. The rejection is hereby traversed and reconsideration is respectfully requested.

Compensation circuits of the type covered by claim 11 are routine in the art. It is well known by skilled artisans who design or use electrical sensors that ambient conditions can effect the accuracy of such sensors. It is common practice to use temperature and/or pressure compensation circuits to correct for any inaccuracies in

temperature and pressure measurements. Such circuits are routinely available and their implementation are within the ordinary skill in the art. It is therefore submitted that claim 11 meets all of the requirements of 35 USC Section 112 and withdrawal of the rejection is therefore deemed proper and is respectfully requested. It is noted that claim 11 has not been rejected on prior art grounds and therefore it is submitted that claim 11 is in condition for allowance.

Claims 1-10, 13-19, 21-24 and 27 stand rejected as obvious over Mostowy in view of Schaum. The Office Action states that Mostowy teaches a temperature sensor and a pressure sensor for monitoring a gas piping system and a computer for processing the data and reporting results. It is admitted in the Office Action that Mostowy fails to provide reference data sets.

Schaum is stated to teach a reference data set that shows respective pressures and temperatures where a product is a liquid and a gas. The Office Action concludes that it would have been obvious to one of ordinary skill in the art to use Schaum's reference data set to predict the onset of liquefaction because if liquefaction occurs, pumping becomes more difficult. The rejection is hereby traversed and reconsideration is respectfully requested.

The present invention is directed to a method and system for monitoring a liquefaction status for a gas based on pressure and temperature information about the gas. The pressure and temperature information is gathered from a gas product flowing in a gas piping system. The liquefaction status is determined from this

gathered information which is directly or indirectly based on pressure and temperature. The purpose of the present invention is to provide an early warning system when there exists the possibility of a gas reaching conditions in which there is a reasonably likelihood that the gas will begin to liquefy. It is this early warning system that enables operators of a plant to prevent the deleterious effects of liquefaction. If there is a danger that the gas will turn into a liquid, then the operator of the plant can take specific steps to modify the process conditions to prevent liquefaction. However, such modifications to prevent liquefaction is not part of the claimed invention.

The liquefaction monitoring system of the present invention involves in one aspect, calculating a theoretical state of the gas product from accurate saturation property data that are available for a given gas and comparing the input parameters with the theoretical state to determine the product state or liquefaction status in the piping system. As described beginning on page 5 of the specification, a theoretical state of the product gas may be represented by a saturation data curve (see Figure 2) and a series of tolerance level curves are derived from data sets relative to the saturation data curve. The data sets are therefore a necessary part of the liquefaction monitoring system and if the liquefaction status of the gas is in certain proximity to the tolerance level curves there is a warning system that liquefaction is imminent as described in detail on page 7, beginning at line 14.

The Mostowy reference (U.S. Patent No. 5,539,998) is not directed to a liquefaction monitoring process. The purpose of Mostowy is to transfer and deliver

a hygroscopic, corrosive chemical from an elevated pressure source of supply to a lower pressure use point. The reference apparatus removes contaminants (e.g. moisture) from the gas stream such as through the use of a dehydrator, filters and the like. This type of instrumentation is used to minimize the formation of two-phase flow comprising a gaseous hydrogen chloride phase and a liquid hydrogen chloride phase which occurs at various areas of pressure drop through the high gas flow delivery conduit as indicated at column 5, lines 58-64. It is also desirable to prevent moisture from condensing out and accumulating at various parts of the apparatus. Thus, Mostowy is directed to a system in which the flow is monitored and efforts are made to remove contaminants from the flow.

It is noted that Mostowy discloses a sensing and alarm system to determine and report the condition of "liquid dry point". This is a condition wherein pressurized liquid chemicals such as hydrogen chloride, provided at the source, is slowly vaporized to provide a saturated gas supply. A physical state ultimately occurs where all of the liquid has been vaporized and the residual chemical still under elevated pressure is entirely in an unsaturated, single phase gas phase (column 6, beginning at line 36).

The alarm system of Mostowy, however, is concerned with the source of supply and not with the gas piping system. Unlike the present invention, Mostowy discloses an apparatus that senses the temperature of a chemical transferred from the source of supply and the rate of pressure decline and then uses this information to generate an alarm if the chemical in the source of supply is in the gas phase

(column 2, lines 51-60). Thus, Mostowy differs from the claimed invention in at least two material respects. Sensing is done at the source of supply and not along the piping system. In addition, the Mostowy alarm system generates an alarm at the source of supply when the source is in the gas phase. To the contrary, the present invention is concerned with a liquefaction monitoring system in a piping system in which the gas is flowing. The purpose of the alarm system is to issue a warning when there is any reasonable possibility of the gas turning into a liquid.

Thus, Mostowy relates to an entirely different system, with different objects, and an entirely different means of carrying out the stated objects than that disclosed and claimed in the present invention.

It should be further noted that the Mostowy system, as previously indicated, uses various equipment such as a heater to remove moisture and other contaminants from the gas stream. Downstream of the supply source conduit, as indicated at column 8, lines 48-50, the Mostowy process provides the chemical in gaseous form, above the condensation temperature of moisture at appropriate designated pressure specifications, to an appropriate use point. There is no monitoring of liquefaction in the piping system nor any reason to do so.

Because Mostowy does not teach a liquefaction monitoring process, the citation of Schaum covering generic pressure versus temperature thermodynamic phase diagrams can not be used to modify the Mostowy reference to support the rejection. There is no motivation on the part of one of ordinary skill in the art to

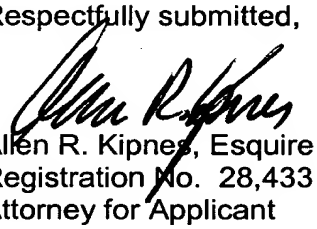
modify the process of Mostowy to provide a liquefaction monitoring system. Because there is no motivation to provide liquefaction monitoring, there is no motivation to employ the generic descriptions provided in Schaum to employ data sets in a manner that would make such information useful in arriving at the claimed invention.

Furthermore, the Schaum publication is directed to a generic pressure versus temperature thermodynamic phase diagram as shown in Figure 4-2. It should be noted that this figure does not provide reference data for "hydroscopic, corrosive chemicals" of the type for delivery using the Mostowy system. Therefore, it would also not be obvious to use Schaum to detect the onset of liquefaction of these chemicals in the Mostowy apparatus. Thus, one of ordinary skill in the art would not be motivated to combine Mostowy with Schaum for this reason as well. Even if the references were properly combinable, they would not lead one of ordinary skill in the art to the presently claimed system which is a liquefaction monitoring system not a gas delivery system as described by Mostowy. Applicants invention is directed to a system for monitoring the liquefaction of gas based on the operating pressure and operating temperature of the gas in a gas piping system. This is not what is disclosed or suggested in Mostowy. Accordingly, the presently claimed invention is neither taught nor suggested in Mostowy. and Schaum either alone or in combination. It is therefore submitted that claims 1-10, 13-19, 21-24 and 27 are free of the prior art and early passage to issue is therefore deemed proper and is respectfully requested.

In view of the foregoing, Applicants submit that the present application is in condition for allowance and early passage to issue is therefore deemed proper and is respectfully requested.

It is believed that no fee is due in connection with this Amendment. However, if any fee is due, it should be charged to Deposit Account No. 23-0510.

Respectfully submitted,



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